DOCUMENT RESUME

ED 028 031 RE 001 436

By-Braun, Carl

The Efficacy of Selected Stimulus Modalities in Acquisition and Retention of Sex-Typed Textual Responses of Kindergarten Children.

Pub Date 25 Ap- 68

Note-22p.; Paper presented at International Reading Association conference, Boston, Mass., April 24-27, 1968.

EDRS Price MF-$0.25 HC-$1.20

Descriptors-*Aural Learning, Females, Interest Scales, Kindergarten, Males, *Pictorial Stimuli, *Retention, *Visual Learning, *Word Study Skills

The hypothesis that a combined pictorial and textual stimulus would result in shared and thus reduced stimulus control was investigated. It was also hypothesized that interest-loading of the word stimuli would heighten the attention given to the stimulus. Colorful content words were pictorially representable nouns selected on the basis of their being boy-words or girl-words. A random sample of 240 kindergarten children was drawn from a sampling frame stratified by sex and ability level. Four sets of criterion word cards were prepared. Two of these were used for the auditory-visual presentation and were accompanied by illustration. The two sets used for the auditory presentation had only the words on the cards. Learning and test cycles were alternated until the subject responded correctly on two successive test trials. The results based on acquisition consistently favored the auditory treatment. With regard to interest-loading, insignificant F ratios were found for high ability children; significant ratios were found for low ability children. Boy- and girl-word treatments favored the sex with which they were associated. (WL)

Carl Braun,
Associate Professor of Education.

ED026043

The Efficacy of Selected Stimulus Modalities in Acquisition and Retention of Sex-Typed Textual Responses of Kindergarten Children.

Carl Braun

Outstanding Dissertation : April 25, 1 : 30 - 2 : 30 p.m.

THE PROBLEM

This study was designed to investigate the differential effects in rate of acquisition and retention of textual responses as a result of presentation of discriminating stimuli involving varying sensory modalities - auditory and auditory-visual - at the kindergarten level. Along with the hypothesis that a summation of a pictorial and textual stimulus would result in shared, and thus in reduced stimulus control, it was hypothesized that an interest-loading inherent in the word stimulus would aid in achieving heightened attention to the stimulus and more efficient learning and retention.

DEFINITION OF TERMS

Throughout the study terms crucial to the reader's understanding are employed. Several of these terms are used so frequently that a brief explanation at this point seems desirable.

Textual Operant - Since the term "reading" generally refers to a multiplicity of processes, the narrower term, "textual operant" or "textual behavior" is used in most instances in this study. A textual operant is a vocal response brought under the control of a non-auditory verbal stimulus (Skinner, 1957), or somewhat more generally stated, a speech response brought under the control of appropriate stimulation (Staats and Staats, 1963). The stimulus involved in this study is the printed word.

Colorful content words - For purposes of this study colorful content words are designated as words capable of evoking a mental image, and as such pictorially representable. All words used in the study are nouns.

DESIGN OF THE STUDY AND PROCEDURES

Selection of Texts for the Study

A sample of University of Minnesota graduate students and faculty was selected to respond to 264 colorful content words from the Murphy Word List (1957) to establish the basis for a boy-girl interest dichotomy. The twenty-one words of highest frequency for each sex were illustrated and presented to the total first grade population (437) of the Fort Garry Schools for further sex-type validation. From the ten words with the highest response differential for each sex, four words were matched for word length, configurational elements, compound parts, and intra-list confusability, to be used for the criterion word cards. Table I presents the matched lists of texts used in the experiment.

RE 001 436

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

TABLE I

MATCHED LISTS OF CRITERION TEXTS

		Ascenders & Descenders	Word Length	Compound Parts
B	rocket	2	6	none
O Y	football	5	8	2
W O	airplane	2	8	2
R D	truck	2	5	none
G	teaset	2	6	2
I R	playhouse	4	9	2
L W	ballerina	3	9	none
O R D	fairy	2	5	none

Sample

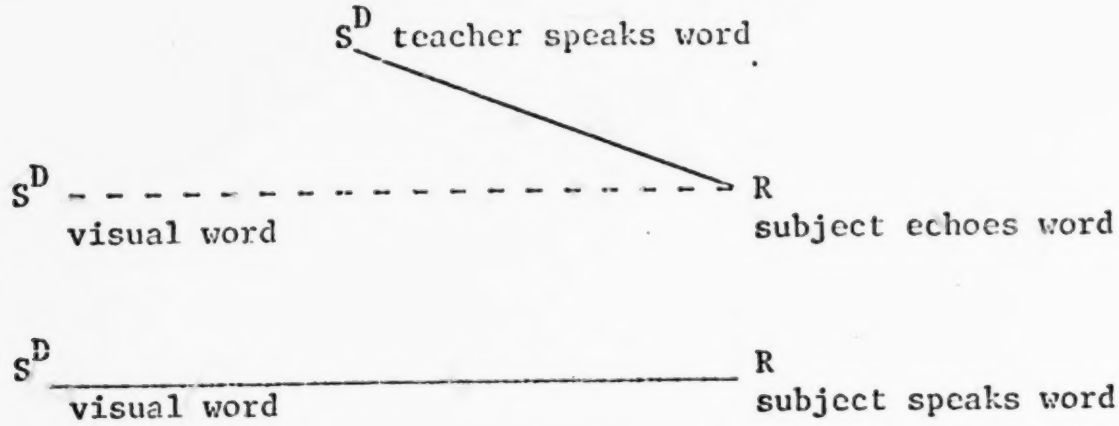
A random sample of 240 kindergarten children from the Fort Garry Schools was drawn from a sampling frame stratified on the basis of sex and ability level. These subjects constituted the treatment groups for the auditory-visual boy-word, auditory-visual girl-word, auditory boy-word, and auditory girl-word treatments. The criterion for ability stratification was scores achieved on the Harris-Goodenough Drawing Test (1963).

Description of Treatments

Four sets of criterion-word cards were prepared on 3½" by 11" strips of heavy paper. The two sets used for the auditory presentation had only the criterion word on the card. The two sets to be used for the auditory-visual presentation had the word on the card plus an accompanying illustration of the word. The criterion-word cards were laminated to ensure that the subject would not attend to extraneous stimuli and irrelevant cues such as finger marks to achieve mastery of the criterion.

Auditory Treatment

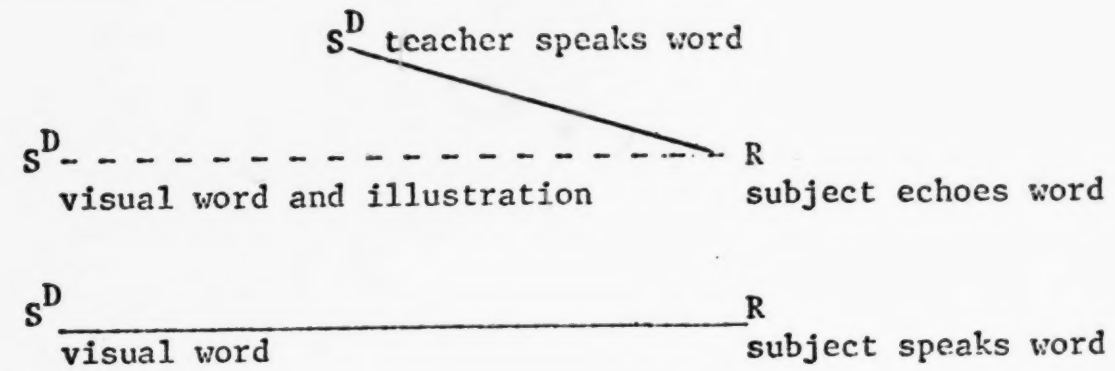
The auditory treatment was based on the simplest model for training a textual response, which, according to Staats (1963) involves presenting the written verbal stimulus, saying the word aloud, and having the subject emit a response that matches the sound - an echoic response. A graphic representation of the model follows:



The four criterion word cards were presented in randomized order. Approximately three seconds were allowed for each word exposure and three seconds between presentations. Each learning cycle (i.e. presentation of complete set of four cards) was followed by a test cycle to determine the number of words the subject had learned to discriminate. Learning and test cycles were alternated until the subject responded acceptably on two successive test trials to each word up to a maximum of fifteen complete cycles. Correct and incorrect responses were recorded on each trial. Average number of trials to achieve mastery was designated as the acquisition score.

Auditory-Visual Treatment

The auditory-visual model approximates the auditory model in every respect except for an accompanying illustration with each word presentation. A graphic representation of the model appears below:



Testing and scoring procedures were identical to the auditory treatment.

Retention Tests

A related part of the study involved a test for retention of the responses acquired, twenty-four hours after the learning trials. The words presented in the learning-test cycle were presented only once in the retention test. The number of words retained was designated as the retention score.

Treatment Designation

Tables II and III indicate the breakdown of subjects by sex and ability in the learning and retention treatments.

TABLE II

SUMMARY OF LEARNING TASK TREATMENTS ASSIGNED TO THE SAMPLE SUBGROUPS

TRT. CELLS					N	
Cell Number	Ability Level	Stimulus Modality	Stumulus Words	Trt. Group	Boys	Girls
1	High	auditory	boy-words	BWA	15	--
2	Low	auditory	boy-words	BWA	15	--
3	High	auditory	girl-words	GWA	15	--
4	Low	auditory	girl-words	GWA	15	--
5	High	aud.-visual	boy-words	BWAV	15	--
6	Low	aud.-visual	boy-words	BWAV	15	--
7	High	aud.-visual	girl-words	GWAV	15	--
8	Low	aud.-visual	girl-words	GWAV	15	--
9	High	auditory	boy-words	BWA	--	15
10	Low	auditory	boy-words	BWA	--	15
11	High	auditory	girl-words	GWA	--	15
12	Low	auditory	girl-words	GWA	--	15
13	High	aud.-visual	boy-words	BWAV	--	15
14	Low	aud.-visual	boy-words	BWAV	--	15
15	High	aud.-visual	girl-words	GWAV	--	15
16	Low	aud.-visual	girl-words	GWAV	--	15

TOTAL N -- 240

TABLE III

SUMMARY OF RETENTION TASK TREATMENTS

BY SAMPLE SUBGROUPS

TRT. CELLS						
Cell Number	Ability Level	Stimulus Modality	Stimulus Words	Trt. Group	N Boys	N Girls
1	High	auditory	boy-words	BWA	15	--
2	Low	auditory	boy-words	BWA	14	--
3	High	auditory	girl-words	GWA	15	--
4	Low	auditory	girl-words	GWA	15	--
5	High	aud.-visual	boy-words	BWAV	14	--
6	Low	aud.-visual	boy-words	BWAV	13	--
7	High	aud.-visual	girl-words	GWAV	15	--
8	Low	aud.-visual	girl-words	GWAV	14	--
9	High	auditory	boy-words	BWA	--	15
10	Low	auditory	boy-words	BWA	--	15
11	High	auditory	girl-words	GWA	--	15
12	Low	auditory	girl-words	GWA	--	15
13	High	aud.-visual	boy-words	BWAV	--	13
14	Low	aud.-visual	boy-words	BWAV	--	15
15	High	aud.-visual	girl-words	GWAV	--	14
16	Low	aud.-visual	girl-words	GWAV	--	15

TOTAL N -- 232

METHODS OF ANALYSIS

Preliminary to the main analysis, mean differences in treatment effect for various subgroups were examined to determine possible trends in direction of mean differences without regard to significance level.

Further, three-way analyses of variance were run for each text using a 2x2x2 factorial design. The independent variables were ability level, sex, and interest loading. The dependent variables used were number of words learned, acquisition scores, and the retention measure. The purpose of this analysis was to determine the possible existence of gross inconguities in treatment effect for specific words in relation to the effect when a complete set of words was considered.

The main analysis was concerned with comparisons of mean scores between various treatment groups. Since specific questions related to the acquisition measures were stated in the form of hypotheses before the analysis was carried out, it was decided to run a series of orthogonal or independent comparisons based on the hypotheses. The dependent variables used were (a) number of words learned, and (b) acquisition score based on the mean number of trials required to reach the criterion. Orthogonal comparisons were also run using the retention measure as the dependent variable.

Since the orthogonal comparisons for both acquisition and retention measures were run within sex levels, the error variance term used for the comparison was based on scores within sex rather than across both sexes.

To determine whether a relationship exists between retention and treatment methods independent of learning scores, two three-way analyses of covariance, within sex, were run on the retention scores. The covariate used was number of words learned. Further, one-way analyses of covariance were run on retention using interest-loading as the main effect. The covariates were number of words learned and acquisition score.

Analysis of the Data

Examination of Treatment Means

Tables IV, V and VI summarize comparative means and standard deviations of selected sub-treatment groups using the acquisition scores, number of words learned, and retention score respectively.

TABLE IV

DESCRIPTIVE DATA FOR TREATMENT GROUPS ON ACQUISITION SCORES

ACROSS ALL TREATMENT GROUPS $\bar{x}$ = 7.90 S.D.= 3.90	Girls	Boy-words	Auditory	B.W. (High Ability) $\bar{x}$= 7.80 S.D.=3.47
				G.W. (High ability) $\bar{x}$= 11.61 S.D.=1.88
			Auditory-Visual	B.W. (High ability) $\bar{x}$= 7.37 S.D.= 3.61
		$\bar{x}$= 7.12 S.D.=3.76		G.W. (High ability) $\bar{x}$= 6.67 S.D.=2.86
		Girl-words	Auditory	B.W. (Low ability) $\bar{x}$= 8.14 S.D.= 3.70
				G.W. (Low ability) $\bar{x}$= 8.49 S.D.= 3.32
	$\bar{x}$=7.67 S.D.=3.67	$\bar{x}$ = 8.23 S.D.=3.49	Auditory-Visual	B.W. (Low ability) $\bar{x}$= 5.17 S.D.=3.51
				G.W. (Low ability) $\bar{x}$= 6.15 S.D.=2.77
	Boys	Boy-Words	Auditory	B.W. (High ability) $\bar{x}$=11.38 S.D.=2.79
				G.W. (High ability) $\bar{x}$=10.95 S.D.=2.60
			Auditory -Visual	B.W. (High ability) $\bar{x}$=8.45 S.D.=3.60
		$\bar{x}$= 8.81 S.D.=3.66		G.W. (High ability) $\bar{x}$= 6.96 S.D.= 4.10
		Girl-Words	Auditory	B.W. (Low ability) $\bar{x}$= 9.33 S.D.= 3.27
				G.W. (Low ability) $\bar{x}$= 9.21 S.D.= 3.37
	$\bar{x}$= 8.12 S.D.= 4.11	$\bar{x}$= 7.43 S.D. =4.41	Auditory-Visual	B.W. (Low ability) $\bar{x}$= 6.06 S.D.= 2.77
				G.W. (Low ability) $\bar{x}$=2.61 S.D.= 1.95
			$\bar{x}$= 4.34 S.D.=2.95	

TABLE V.

DESCRIPTIVE DATA FOR TREATMENT GROUPS ON NUMBER OF WORDS LEARNED

ACROSS ALL TREATMENT GROUPS	Girls	Boy-words	Auditory	B.W. (High ability) $\bar{X}$ =3.27 S.D.= .99
				G.W. (High ability) $\bar{X}$ = 3.87 S.D.= .34
			Auditory-Visual $\bar{X}$ = 3.50 S.D.= .92	B.W. (High ability) $\bar{X}$ = 3.20 S.D.=1.11
		$\bar{X}$ = 2.98 S.D.=1.22		G.W. (High ability) $\bar{X}$ = 3.80 S.D.= .54
		Girl-Words	Auditory $\bar{X}$ = 3.33 S.D.=1.01	B.W. (Low ability) $\bar{X}$ = 3.27 S.D.=1.06
				G.W. (Low ability) $\bar{X}$ = 3.40 S.D.= .95
			Auditory-Visual	B.W. (Low ability) $\bar{X}$ = 2.20 S.D.=1.33
	$\bar{X}$=3.28	$\bar{X}$=3.58		G.W. (Low ability)
	S.D=1.04	S.D.=.71	$\bar{X}$ = 2.73 S.D.=1.18	$\bar{X}$ = 3.27 S.D.= .68
	Boys	Boy-words	Auditory	B.W. (High ability) $\bar{X}$ = 4.00 S.D.= .00
				G.W. (High ability) $\bar{X}$ = 3.80 S.D.= .40
			Auditory-Visual $\bar{X}$ = 3.37 S.D.=.91	B.W. (High ability) $\bar{X}$ = 3.60 S.D.= .61
		$\bar{X}$=3.55 S.D.=.76		G.W. (High ability) $\bar{X}$ = 3.13 S.D.=1.09
		Girl-Words	Auditory $\bar{X}$ = 3.53 S.D. =.72	B.W. (Low ability) $\bar{X}$ = 3.60 S.D.= .61
				G.W. (LOw ability) $\bar{X}$ = 3.47 S.D.= .81
			Auditory-Visual	B.W. (Low ability) $\bar{X}$ = 3.00 S.D.=1.04
$\bar{X}$=3.27 S.D.= 1.05	$\bar{X}$=3.26 S.D=1.07	$\bar{X}$=2.97 S.D=1.24		G.W. (Low ability)
			$\bar{X}$ = 2.23 S.D. =1.26	$\bar{X}$ = 1.47 S.D. =.96

TABLE VI .

DESCRIPTIVE DATA FOR TREATMENT GROUPS ON RETENTION SCORES

ACROSS ALL TREATMENT GROUPS	Girls	Boy-words	Auditory	B.W. (high ability) $\bar{X}$ = 1.73 S.D.=1.06
				G.W. (high ability) $\bar{X}$ = 3.47 S.D.= .88
			Auditory-Visual	B.W. (high ability) $\bar{X}$ = 1.92 S.D.=1.21
		$\bar{X}$=1.78 S.D.=1.00	$\bar{X}$ = 2.26 S.D.=1.04	G.W. (high ability) $\bar{X}$ = 2.57 S.D.= .73
		Girl-Words	Auditory	B.W. (low ability) $\bar{X}$ = 2.13 S.D.= .72
				G.W. (low ability) $\bar{X}$ = 2.13 S.D.=1.15
			Auditory-Visual	B.W. (low ability) $\bar{X}$ = 1.33 S.D.= .79
	$\bar{X}$ = 2.21	$\bar{X}$ = 2.64		G.W. (low ability) $\bar{X}$ = 2.40 S.D.=1.14
	S.D.=1.15	S.D.=1.12	$\bar{X}$ = 1.87 S.D.=1.12	
	Boys	Boy-words	Auditory	B.W. (high ability) $\bar{X}$ = 2.93 S.D.=1.00
				G.W. (high ability) $\bar{X}$ = 2.47 S.D.= .96
			Auditory-Visual	B.W. (high ability) $\bar{X}$ = 2.14 S.D.= .99
		$\bar{X}$ = 2.54 S.D.=1.07	$\bar{X}$ = 2.03 S.D.=1.22	G.W. (high ability) $\bar{X}$ = 1.93 S.D.=1.39
		Girl-Words	Auditory	B.W. (low ability) $\bar{X}$ = 3.00 S.D.= .84
				G.W. (low ability) $\bar{X}$ = 1.80 S.D.=1.04
			Auditory-Visual	B.W. (low ability) $\bar{X}$ = 2.00 S.D.=1.04
$\bar{X}$=2.18				G.W. (low ability)
S.D.= 1.18	$\bar{X}$ = 2.15	$\bar{X}$ = 1.78		$\bar{X}$= .86 S.D.= .83
	S.D.=1.21	S.D.=1.22	$\bar{X}$ = 1.41 S.D.=1.10	

The tables indicate that mean differences between boy and girl-word treatments for girls favor the girl-word treatment groups. The differences for boys favor the boy-word treatment groups. These differences hold for the three dependent variables. When comparisons are made between treatment cells there is only one mean difference that does not favor the direction of differences hypothesized. This is the BWAV vs GWAV treatment for high ability girls on the acquisition score means. On both the number of words learned and retention measure however, the differences favor the GW treatment. On the BWA vs GWA for low ability girls the means are equal on the retention measure.

Mean differences between auditory and auditory-visual treatments consistently favor the auditory treatment on the three dependent variables for both girls and boys.

Although no hypotheses in the study were made regarding treatment differences between girls and boys, it is noteworthy that the mean differences are very small. The greatest difference that exists is in the acquisition score means which favors the boys by a mean difference of .45 .

Analysis of Treatment Effects on Individual Texts.

Table VII presents a summary of significant F ratios for the analysis of variance on separate words.

Table VII follows

TABLE VII

SUMMARY OF SIGNIFICANT OUTCOMES ON ANALYSIS OF VARIANCE ON SEPARATE WORDS

CRITERION MEASURE	LEVEL	AIRPLANE	FOOTBALL	ROCKET	TRUCK	BALLERINA	PLAYHOUSE	TEASET	FAIRY
Acquisition Score	Sex	**B	**B	**B	**B	**G	**G	**G	**G
	Ability		**H	**H			*H	*H	**H
	Treatment			**A	*A				
Number of Words Learned	Sex		**B	**B	*B	**G	**G	*G	
	Ability			**H	**H		*H	*H	**H
	Treatment	*A			**A	*A	*A	**A	
Retention Score	Sex		*B		*B		**G		*G
	Ability					**H			**H
	Treatment	**A		*A	*A	**A	*A	**A	

* Significant at .05 level

** Significant at .01 level

H - High Ability

A - Auditory

B - Boys

G - Girls

The table shows that when words are analyzed individually for treatment effects, that significant findings are more prevalent on the retention criterion than on either the acquisition scores or number of words learned. All significant findings show facilitation on the auditory treatment effect. This is congruous with the direction of mean differences indicated in Tables IV, V, and VI.

When sex effect is considered, significant differences are more prevalent for acquisition criteria than for the retention measure. The direction of significance in the BW treatment favors boys in every case; direction of differences for the GW treatment favors girls. None of the words in the two treatments show any significant sex effect when the three dependent variables are considered.

In the analysis of ability effects, all significant differences favor the high ability groups. On the whole, the findings give no indication of any single text seriously affecting the outcomes on analyses on complete lists of texts.

Main Outcome Variables

Since the tests of the hypotheses involved forty-five comparison tables, only a summary of significant F values is presented here. Table VIII presents these findings.

Table VIII follows.

TABLE VIII

SUMMARY OF SIGNIFICANT OUTCOMES ON ORTHOGONAL COMPARISONS

COMPARISONS	BOYS			GIRLS		
	No. of Words Learned	Acquisition Score	Retention Measure	No.of Words Learned	Acquisition Score	Retention Measure
BWA & GWA vs BWAV & GWAV (High ability)	*A	**A	*A		**A	
BWA & GWA vs BWAV & GWAV (Low ability)	**A	**A	**A	*A	**A	
BWA vs GWA (High ability)					**G.W.	**G.W.
BWA vs GWA (Low ability)			**B.W.			
BWAV vs GWAV (High ability)						**G.W.
BWAV vs GWAV (Low ability)	**B.W.	**B.W.	**B.W.	**G.W.		

* Significant at .05 level
** Significant at .01 level

A - auditory
A.V.- auditory-visual

B.W. - Boy-words
G.W. - Girl-words

Tabel IX summarizes F values for analysis of covariance on the retention scores, with number of words learned used as the covariate.

TABLE IX

SUMMARY OF F VALUES ON THREE-WAY ANALYSIS OF COVARIANCE (WITHIN SEX) ON RETENTION MEASURE

Source of Variation	D.F.	F Value-Boys	D.F.	F. Value-Girls
Ability	1,106	.3222	1,108	1.9832
Treatment	1,106	.2956	1,108	1.1171
Interest	1,106	4.0784*B.W.	1,108	12.2940**G.W.
A X Trt.	1,106	.7707	1,108	.5153
A X Int.	1,106	2.2673	1,108	3.3659
Trt. X Int.	1,106	3.3532	1,108	.2344
A X Trt. X Int.	1,106	.5158	1,108	6.6382*

* Significant at .05 level

** Significant at .01 level

The table shows that significance in treatment effects dissappears for the retention measure when number of words learned is held constant. Interest-loading effect is significant for both girls and boys, although the interpretation of the finding for girls is obscured by a 3-way interaction significant at the .05 level.

Tables X, XI and XII give the findings on the one-way analysis of covariance when acquisition score, number of words learned, and the two combined variables are used as covariates respectively.

The tables indicate highly significant differences in interest-loading effects when either one or two covariates are used. In every analysis the treatment difference favors the expected direction of significance.

TABLES X, XI and XII follow.

TABLE X

ANALYSIS OF COVARIANCE ON INTEREST-LOADING TREATMENTS ON RETENTION SCORES (COVARIATE = ACQUISITION SCORE)

	Source of Variation	D.F.	Sum of Squares	Mean Square	F ratio	P value
GIRLS	Interest	1	10.3691	10.3691	10.5146**G.W.	.001
	Error	115	131.6116	1.1444		
	Adjusted Error	114	112.4221	.9862		
BOYS	Interest	1	3.8555	3.8555	4.7190*BW	.032
	Error	113	152.0642	1.3457		
	Adjusted Error	112	91.5064	.8170		

* Significant at .01 level

** Significant at .05 level

G.W. = Girl-word

B.W. = Boy-word

TABLE XI

ANALYSIS OF COVARIANCE ON INTEREST-LOADING TREATMENTS ON RETENTION SCORES (COVARIATE - NUMBER OF WORDS LEARNED)

	Source of Variation	D.F.	Sum of Squares	Mean Square	F ratio	P value
GIRLS	Interest	1	14.0604	14.0604	15.9580**GW	.0003
	Error	115	131.6116	1.1444		
	Adjusted Error	114	100.4445	.8811		
BOYS	Interest	1	7.6343	7.6343	9.1166**BW	.003
	Error	113	152.0642	1.3457		
	Adjusted Error	112	93.7892	.8374		

* Significant at .01 level

** Significant at .05 level

G.W. = Girl-word

B.W. = Boy-word

TABLE XII

ANALYSIS OF COVARIANCE ON
INTEREST-LOADING TREATMENTS ON
RETENTION SCORES (2 COVARIATES)

	Source of Variation	D.F.	Sum of Squares	Mean Square	F ratio	P value
GIRLS	Interest	1	12.0161	12.0161	13.5695**GW	.0004
	Error	115	131.6116	1.1444		
	Adjusted Error	113	100.0641	.8855		
BOYS	Interest	1	4.5691	4.5691	5.8507**BW	.017
	Error	113	152.0642	1.3457		
	Adjusted Error	111	86.6859	.7809		

* Significant at .01 level

** Significant at .05 level

G.W. = Girl-word

B.W. = Boy-word

SUMMARY OF FINDINGS

Findings on Acquisition Measures - Auditory and Auditory-Visual Treatment Effects.

1. Mean differences consistently favored the auditory treatment. These differences reached significance for both boys and girls.

2. No salient differences were apparent in treatment effects between high and low ability groups.

Interest-Loading Effects - Within Auditory Treatment.

1. Almost without exception, differences in Boy and Girl-word treatments favored the sex of the subject associated with the predicated sex-loading.

2. Differences in interest-loading within the auditory groups reached significance for high ability girls, but failed to reach significance for low ability girls.

3. For the boys, non-significant F values were found in learning scores for both high and low ability groups.

Interest-Loading Effects - (Within Auditory-Visual)

1. Non-significant F ratios were found for high ability girls and boys.

2. Highly significant differences were found for low ability boys and girls on both acquisition variables.

Interest-Loading-(Over-all Effect)

1. When number of words learned was used as a covariate in a three-way analysis of covariance, differences in means for retention were significant for both girls and boys. Interpretation of the findings for girls, however, was clouded by a second order interaction. Further analyses, using a one-way covariance design showed highly significant differences favoring the predicated interest-loading for both girls and boys.

Findings on Retention Measures

Auditory and Auditory-Visual Treatment Effects

1. Differences in mean retention scores reached significance for boys, differences favoring the auditory treatment. When number of words learned was used as covariate, differences in means were non-significant for both girls and boys.

2. No major differences were apparent in treatment effects between high and low ability groups.

Interest-loading Effects - (Within Auditory Treatment)

1. Differences in treatment effects consistently favored the sex of the subject associated with the predicated interest-loading.

2. Differences in interest-loading effects reached significance for high ability girls.

3. Significant F ratios were noted for low ability boys, but not for high ability boys.

Interest-loading Effects - (Within Auditory-visual Treatments)

1. Non-significant F ratios were found in retention mean differences for high ability boys and girls.

2. Highly significant differences were found for low ability boys and girls.

CONCLUSIONS

Several conclusions appear warranted on the basis of findings of the experiment:

1. There is some basis for the assumption that girls and boys at the primary level have already developed some divergent interests. Further, there is evidence to support the fact that adults are competent, within reasonable bounds, to designate referents of interest to boys and girls. It might be argued, on the other hand, that adults are cognizant of the likes and dislikes which the middle class culture imposes upon children.

2. Pictorial accompaniments to a written text appear to perform a distracting role in a text discrimination situation for children of both high and low ability, although differences appear more pronounced with low ability groups. For girls, differences disappear when retention is measured.

3. The results of the investigation point to distinct evidence of differential discriminability related to textual stimuli of sex-related interest-loading. The evidence is more conclusive for subjects of low ability than for the high ability groups.

4. There is evidence, though not unequivocal, that retention of a textual operant after a period of time is facilitated by an interest-loading of the operant related to the sex of the subject. The findings of the investigation give no basis for this being a more potent factor for one ability level than another. There is also no evidence of this factor being related to the sex variable.

5. There are two treatment comparisons which appear to be related to sex. One is the auditory vs. auditory-visual treatment. Discrimination appears to be facilitated to a substantially greater degree for boys by omission of pictorial cues than is the case for girls. The other indication of sex-relatedness is evidenced by the significant findings for boys' retention in favor of the auditory treatment. The conclusion might be drawn that stimulus treatment retention effects may be more important for boys than for girls.

EDUCATIONAL IMPLICATIONS

Implications for educational practice from this study can only be considered within the confines of the limitations relevant to the particular sample and the reliability and validity of measuring instruments. Furthermore, any questions raised can only be tentative, pending further investigation. However, a few points seem pertinent in terms of re-evaluation of current instructional practices and materials:

1. A salient implication arising from the study is that more should be known about the individual child in terms of his interests. Further, these interests should be capitalized upon in individualization of instruction. The determination of specific interests might well be a potent facotr in making provision for the child's "free reading" activities.

2. The findings of the study rather seriously question the widespread use of pictorial cues in word presentation. A re-evaluation of methods of presentation and the use of pictures as

additional stimuli to the textual stimuli would seem in order. The findings lend some support to the notion that such a re-examination may be particularly crucial for low-ability children.

3. Although significant findings related to interest-loading appear in the study, preparation and utilization of materials based on sex-typed referents are unwarranted until more extensive research supports the findings of the present investigation.

REFERENCES

Harris, Dale B. Children's Drawings as Measures of Intellectual Maturity, New York: Harcourt, Brace and World, 1963.

Murphy, Helen M. "The Spontaneous Vocabulary of Children in the Primary Grades," Journal of Education, Boston University, November 1957.

Skinner, B.F. Science and Human Behavior, London: Collier - MacMillan Limited, 1953.

Staats, Arthur W. and Carolyn K. Staats. Complex Human Behavior, New York: Holt, Rinehart and Winston, 1963.